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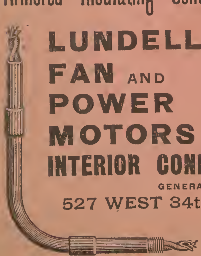

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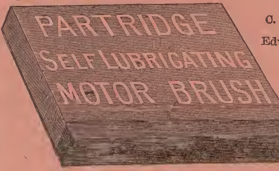

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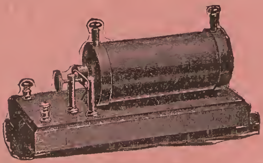

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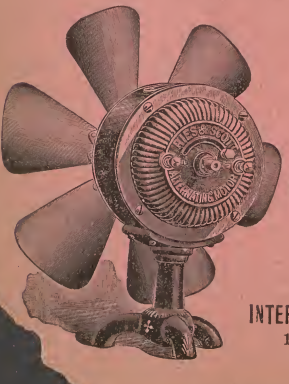

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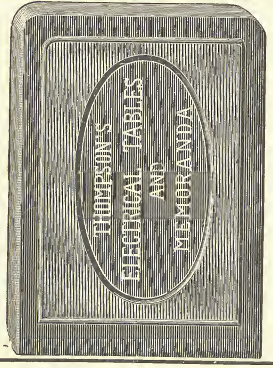

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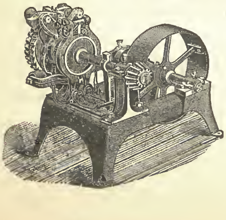

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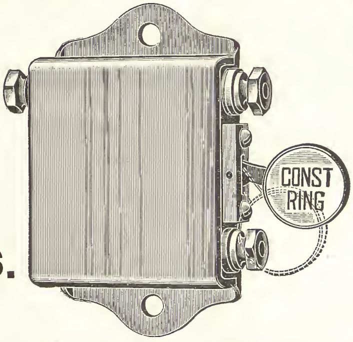

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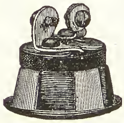

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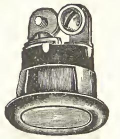

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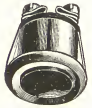

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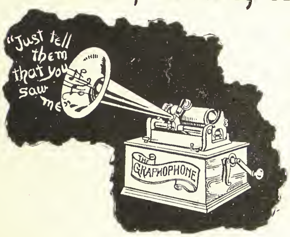
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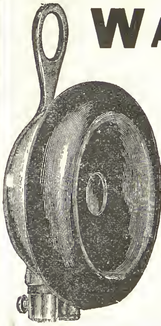

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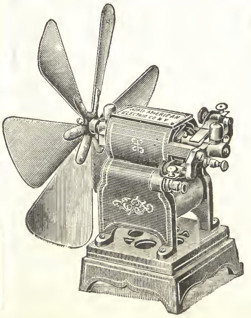

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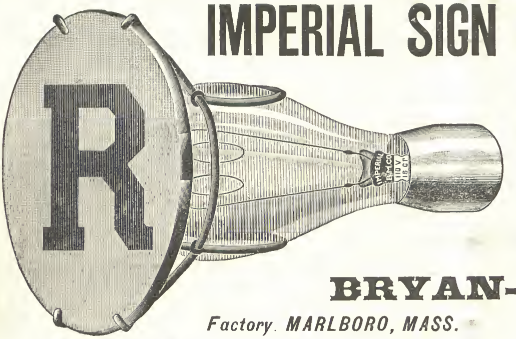

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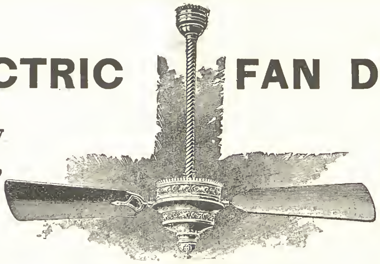

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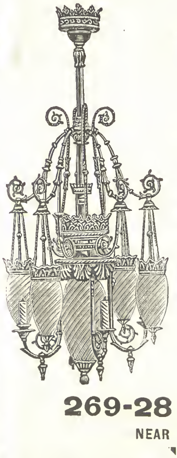

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THE SNOW STEAM PUMP CO.

Comment can be created by the use of two mediums—the ludicrous and the beautiful. In New Orleans the grand fete of the Mardi Gras is a combination of the grotesque and the superb. It is famed throughout the world. Comment means in a certain sense popularity, from which springs revenue to those that have purposely excited it and possess the means by which to retain it. Let us be more definite. The Snow Steam Pump Company, of Buffalo, N. Y., have issued one of the most beautiful catalogues it has ever been our pleasure to receive. As a work of art, it would excite the comment we speak of; as a treatise on pumps written in a deeply interesting manner, without the technicalities of trade, it stands unequalled. We shall cherish their catalogue in our minds as a model of refined advertising, as a work of art, as a means brought to bear upon the higher faculties with all the pleasing effects of a well written and beautifully executed volume. Let us turn to other equally important factors in their progress and hear about their business management.

The Snow Steam Pump Co. are thoroughly well represented in this city by a staff of experts at No. 126 Liberty street, N. Y. Mr. D. H. Gildersleeve, the New York representative, is an able mechanical engineer and thorough business man. Assisted by a competent corps of associates, the application of the Snow Steam Pump Co.'s goods for all kinds of power plants are well shown by Mr. Gildersleeve. We take pleasure in mentioning the names of these assistants: R. R. Brown, R. C. Oliphant and Louis D. Gumpert. J. F. Holloway is consulting engineer. A great deal of lively hustling is going on and the orders are piling in. The Middle and part of the Eastern States are being well canvassed by these gentlemen. A full line of these well-known pumps are kept at their warehouse in West street, New York, ready for immediate shipment. All the Metropolitan Traction Company's four power-houses are equipped with Snow pumps.

The cuts show the interior of their great works in Buffalo, N. Y., and the various styles of pumps that are applicable to electric light, power and railway steam plants.

LORD KELVIN.

At the banquet given to Lord Kelvin by the Corporation and University of Glasgow on the evening of June 16, he spoke (according to the report in the London "Times") as follows:

"I thank you with my whole heart for your kindness to me this evening. You have come here to commemorate the jubilee of my university professorship; and I am deeply sensible of the warm sympathy with which you have received the kind expressions of the Lord Provost regarding myself in his review of my fifty years' service and his most friendly appreciation of practical results which have come from my scientific work. I might, perhaps, rightly feel pride in knowing that the University and City of Glasgow have joined in conferring on me the great honor of holding this jubilee, and that so many friends and so many distinguished men, friends and comrade-day-laborers in science have come from near and far to assist in its celebration, and that congratulations and good wishes have poured in on me by letter and telegram from all parts of the world, I do feel profoundly grateful. But when I think how infinitely little is all that I have done I cannot feel pride; I only see the great kindness of my scientific comrades and of all my friends, in crediting me for so much. One word characterizes the most strenuous of the efforts for the advancement of science that I have made perseveringly during 55 years; that word is failure. I know no more of electric and magnetic force or of the relation between ether, electricity and ponderable matter, or of chemical affinity, than I knew and tried to teach my students of natural philosophy 50 years ago in my first session as professor. Something of sadness must come of failure; but in the pursuit of science inborn necessity to make the effort brings with it much of the *certaminis gaudia*, and saves the naturalist from being wholly miserable, perhaps even allows him to be fairly happy, in his daily work. And what splendid compensations for philosophical failures we have had in the admirable discoveries by observation and experiment on the properties of matter, and in the exquisitely beneficent applications of science to the use of mankind with which these 50 years have so abounded! You, my Lord Provost, have remarked that I have had the good fortune to remain for 50 years in one post. I cordially reply that for me they have been happy years. I cannot forget that the happiness of Glasgow University both for students and professors is largely due to the friendly and genial city of Glasgow in which it lives. To live among friends is the primary essential of happiness; and that, my memory tells me, we inhabitants of the university have enjoyed since I first came to live in it in 1832, 64 years ago! And when friendly neighbors confer material benefits, such as the citizens of Glasgow have conferred on their university, in so largely helping to give it its present beautiful site and buildings, the debt of happiness due to them is notably increased. I do not forget the charms of the old college in the High street and Vennel. Indeed, I remember well when in 1839 the old natural philosophy class-room and apparatus-room (no physical laboratory then) was almost an earthly paradise to my youthful mind. And the old College Green, with the ideal memories of Osbaldistone and Rashleigh and their duel, created for it by Sir Walter Scott, was attractive and refreshing to the

(Continued from Page 456.)

INQUIRY COLUMN.

In this column we shall endeavor to answer all questions relating to the science of electricity that may arise in the minds of our subscribers.

(Q.)—CARBON CONSUMING BATTERY.

New Orleans, July 30, 1896.

Electrical Age Pub. Co.

Dear Sirs :—Being very much interested in your Inquiry Column, I would be happy to be informed of the following questions : Does the carbon consume in the new battery of Dr. Jacques ? Is the cell more economical than a steam-engine ? Kindly oblige with answer.

Yours, faithfully,
Francis A. Cleves.

(A.)—The battery spoken of actually consumes carbon, according to the test published in the Electrical Age of previous issue. Its efficiency is considerably greater than that of a steam-engine, being calculated to be about 80 per cent. Were it even 40 or 50 per cent., and less expensive than *burning* coal, its use would be generally popular.

(Q.)—SEA WATER BATTERY.

Patchogue, August 2, 1896.

Editor of Electrical Age.

Dear Sir :—Is there any reason why a boat propelled by the power from salt water batteries should not succeed? I have made an outfit and will install the motor this week. I expect a heavy current, as my batteries have large copper and zinc plates and dip directly into the sea water.

Yours, respectfully,
R. L. Franz.

(Q.)—GAS ENGINE FOR DYNAMO.

Atlanta, Ga., July 18, 1896.

To Editor Electrical Age:

Dear Sir:—Thanking you in advance for your kindness, will you please answer this question: Can a steady light be obtained by a gas engine and dynamo plant? Is the amount of light obtained more than if the gas was burned direct? I am exceedingly anxious to know because my store needs lighting, on account of competitors, and I can take care of a gas engine. Yours truly,
Elmira Cutting.

(A.)—A steady light can be obtained if a good gas engine is used. More light is obtained when gas drives a dynamo than when it is burned in tips. A 5-HP. plant will pay you to install.

(Q.)—LIGHTNING.

Atlantic City, July 21, 1896.

Electrical Age:

Dear Sir:—I am the proprietor of a hotel out here, and feel that I ought to give my guests the best protection possible. The lightning came forking around here last week and gave everyone a scare. I am going to put up lightning protectors all over, but don't know where to get them. By letting me know you will greatly oblige

Yours truly, August Simmer.

(A.)—Lightning rods can be procured at No. 44 Broad street, New York General Electric Co. Place them at the most prominent points of the house when installing them.

(Q.)—CLOSED GLOBE ARC LAMPS.

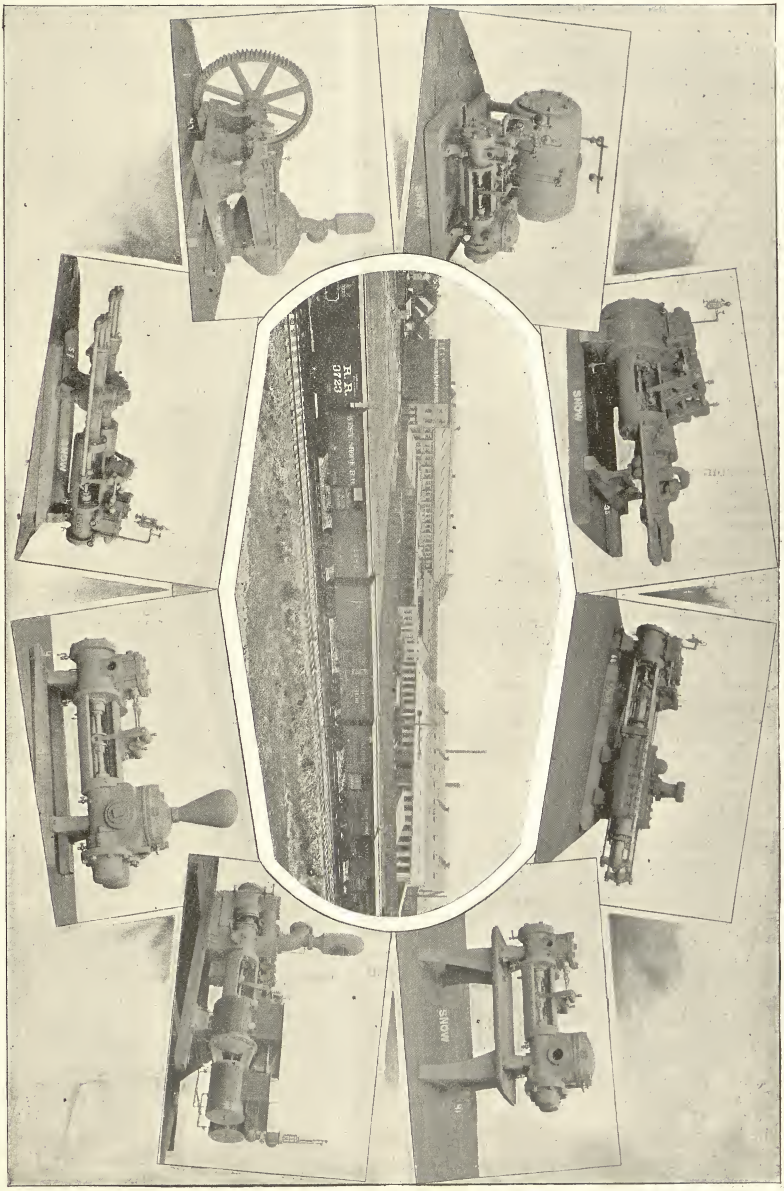
Tampa Bay, Fla., July 8, 1896.

To Elec. Age Pub. Co.:

Dear Sir:—Kindly answer the following question in your Inquiry Column: Can I put more than one closed globe arc lamp on a 110-volt. circuit, or do they differ from the low potential arc lamp without the globe? By giving me this information you will greatly oblige,

Yours truly, Thomas Lang.

(A.)—Only *one* closed globe arc lamp is placed on a



STYLES OF SNOW PUMPS.

110-volt circuit at a time, a resistance being in series with it. The low potential lamp takes 50 volts, the Manhattan at least 80 volts, thus preventing two in series from being burnt and requiring the use of a resistance.

(Concluded from page 454.)

end. But density of smoke and of crowded population in the adjoining lanes increased, and pleasantness, healthiness and convenience of the old college, both for students and professors, diminished year by year. If, my Lord Provost, your predecessors of the Town Council, and the citizens of Glasgow, and well-wishers all over the world, and the government, and the great railway company that has taken the old college, had not given us our new college, I do not believe that attractions elsewhere would have taken me away from the old college; but I do say that the 50 years of professorship which I have enjoyed would have been less bright and happy and I believe also less effective in respect to scientific work, than they have been with the great advantages with which the University of Glasgow has been endowed since its migration from the High street. My Lord Provost, I ask you to communicate to your colleagues of the Town Council, my warmest thanks for their great kindness to me in joining to celebrate this jubilee. Your Excellency, my lords and gentlemen, I thank you all for the kind manner in which you have received the toast of my health proposed by the Lord Provost, and for your presence this evening to express your good wishes for myself."—Science.

Turning from one extreme of temperature to the other, we have the investigations of Pictet in chemical action at temperatures ranging from −50° C. to −155° C. Under the influence of this extreme cold chemical action apparently ceases. For instance, 89 per cent. sulphuric acid, which freezes at −56° C., if cooled to −125° C., may be powdered and mixed with caustic soda of the same temperature without chemical effect. When this mixture is subjected to the spark of a Ruhmkorff coil, reaction slowly sets in and at −80° C. pervades the mass. With ammonia, sulphuric acid reacted at −80° C. to a limited degree, but at −60° the reaction was complete and there was a sudden rise in temperature. With sodium chloride the acid gave no reaction at −50° C., at 25° C. there was limited reaction, and above this the reaction was complete. The following are the author's conclusions:

1. At temperatures between −155° C. and −125° C. no chemical action is perceptible, whatever the nature of the substances employed.

2. Delicate tests, such as those with acids upon litmus paper, can be successfully applied at lower temperatures than may consist with very energetic reactions of other kinds, *e. g.*, that between sodium and sulphuric acid.

3. Every chemical action, according to the temperature at which it takes place, appears under one of two forms: (a) Slow action, which follows when the temperature is kept beneath a certain limit, varying with the substances employed, this kind of action being brought about either by an electric spark or spontaneously, depending upon the difference between the actual temperature and the above limit; (b) complete action, in which the heat generated by chemical union is communicated to the neighboring parts of the compound, until these are equally involved. In order to maintain slow action it is necessary in most cases that this heat be carried off by radiation; otherwise the temperature will very soon rise to that of complete action.

4. The best excitant of slow action is apparently the electric spark.

5. It is experimentally established that every chemical action commences with a period of negative energy, *i. e.*, a period in which external activity must be furnished to the component bodies, in order to allow of their combining.—*Cassier's Magazine.*

HISTORY OF THE X-RAY.

When a current is produced in a vacuum three phenomena are manifested—heat, fluorescence in the glass, and radiant energy; this is detected by a photographic film, some of the rays being cut off, and shadows shown on the film. This describes in a general way the Roentgen experiment.

Faraday found that if a current were produced in a vacuum tube having the positive and negative terminals of the circuit fastened one to each end of the tube, a luminous discharge took place. He also found that the rays coming from the positive terminal (anode) stopped before they reached the rays coming from the negative terminal (cathode), leaving a space known as Faraday's dark space.

This discovery, made in 1828, was followed in 1850 by the construction by Hittorf and Geissler, of Bonn, of the famous Geissler tubes, in which the luminescence was produced in a striated form. It was then found that by diminishing the electric pressure until the luminous effect had almost disappeared, the fluorescence on that part of the tube opposite to the cathode rays was greatly increased. Spittiswoode and Crookes continued their experiments along these lines, Crookes manufacturing his "Crookes' tubes." Then followed the discovery by Goldstein that the cathode rays were affected by a magnet.

In 1891 Hertz found that if a substance were exposed to cathode rays it cast a shadow. Metals were found to have the property of allowing the cathode rays to go through them, particularly aluminum. In 1893 Dr. Paul Lenard found that cathode rays could be made to pass into air. The final discovery was then made by Roentgen of a ray that was not affected by the magnet and which would go through metals.—Dr. Pupin.

WATER PRESSURE.

A crushed mass of iron now lying in a scrap yard at Pittsburg demonstrates the tremendous pressure of water at a great depth. It was constructed for a diving bell, and was intended for use in Lake Michigan. As originally constructed it was a cube about six feet square, tapering slightly at both ends. The material was phosphor-bronze, five-eighths of an inch thick. Each plate was cast with a flange, and they were bolted together, the bolts being placed as closely together as was consistent with strength. The side plates were further strengthened by ribs an inch thick and two inches wide, and the entire structure was strongly braced. The windows, intended to be used as outlooks by the divers inside, were three inches square, fortified with iron bars and set with glass plates one inch thick. The entire weight of the bell was 23,000 pounds. When completed it was sent to Milwaukee and towed out into the lake about 12 miles, where there was over 200 feet of water, and was sent down for a test. The manufacturer of the bell was so confident of its strength that he wanted to go down in it on the test trip. It was well he did not. When it reached a depth of about 100 feet, strong timbers which had been attached to it came to the surface in a splintered condition. Suspecting an accident, the bell was hauled up and found to be crushed into a shapeless mass. The inch-thick plate glass bullseyes were pulverized and the entire body of the bell forced inward until none of its original outlines remained. On a basis of 200 feet depth, the pressure that crushed this seemingly invulnerable structure was 86.8 pounds per square inch, or 353,924 pounds to each side of six feet square. The total pressure, therefore, on the cube was 2,723,548 pounds, or 1,361.7 tons.—Indianapolis Journal.

Phillipsburg, Pa.—The Phillipsburg Electric Lighting, Heating and Power Co. has been organized. Capital, $25,000. A charter has been secured.

STANDARDS OF LIGHT.

PRELIMINARY REPORT OF THE SUB-COMMITTEE OF THE INSTITUTE.

(Continued from Page 442.)

BZ EDWARD L NICKOLS, CLAYTON H. SHARP, AND CHARLES P. MATTHEWS.

In getting the variations of candles, a special device was required to keep the top of the burning candle at constant height in front of the bolometer strip. A suggestion of Mr. C. H. Bierbaum, M. E., resulted in the construction of the following simple and effective arrangement. A spiral spring, about 60 cm. long and 4 cm. in diameter, was attached to a small scale-pan, and the spring was cut off to such a length that when a candle was put on the scale-pan, the elongation was just equal to the length of the candle. The spring would then take up as fast as the top of the candle was lowered by burning. A small piece of sheet metal served to protect the spring from the heat of the candle. In order to keep the scale-pan from swinging sidewise, and from oscillating up and down, a couple of wires were passed vertically through holes on opposite sides of it, and served as loosely fitting guides, which, without interfering with the take-up of the spring, effectually damped any vibrations. The adjustment of a spring to any candle could be made in a few minutes with sufficient accuracy so that the height of the top of a candle burning on the scale-pan would not vary over one mm. in an hour. C, Fig. 2, shows this arrangement in place.

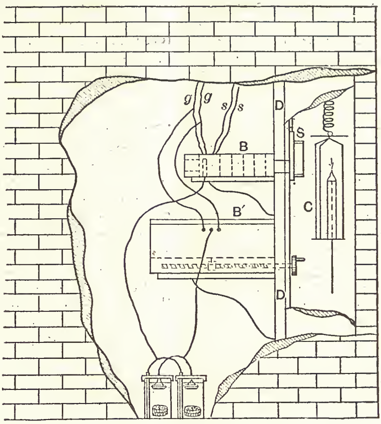


Fig. 2.

Method of Taking Observations.

All determinations of the variations of standards were made at times when the laboratory and its surroundings were very quiet. Most of them were made between the hours of 7 and 12 in the evening; a few were made on holidays, when the laboratory was closed for general work. Before beginning a set of observations the sensitiveness was adjusted, and the galvanometer was carefully watched for a considerable time to get the amount of

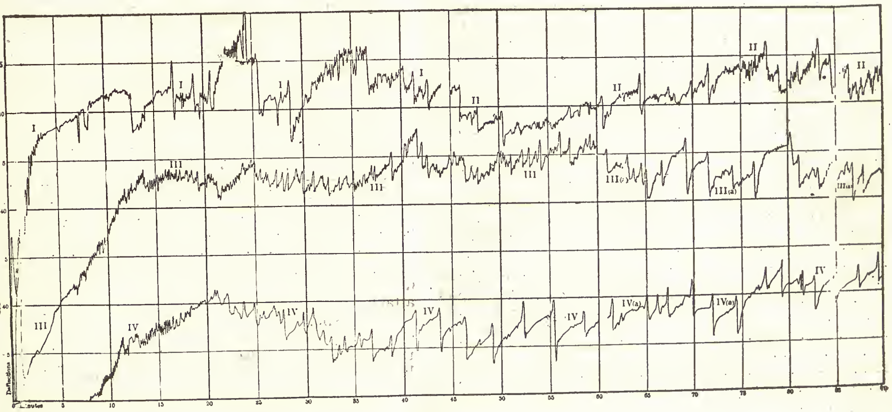


Fig. 3.

its swings due to currents of air about the bolometer strips or to changes in the earth's field. The sensitiveness was also tested from time to time. If the movement amounted to more than two-tenths of a scale division no run was attempted.

After taking these preliminary observations which usually required about an hour's time, the bolometer was exposed to the source of light. The galvanometer deflections were read rapidly by one person and were plotted by another as fast as read, the times being taken from a watch. In this way curves were traced which represent very truly all the changes in the radiation of the light source.

The character of the results obtained with the British candle is exhibited in Fig. 3.

An unfortunate feature in these curves is that the scale of abscissas, representing times, is so small. As a result of this, it has been difficult to represent with the greatest accuracy the true slope of those portions of the curves which correspond to very rapid changes in radiation. In examining the curve,it should be borne in mind that a very steep line may cover several seconds of time, and that it is quite possible that a photometric setting might be made during the time that a candle is executing just such a variation as is represented by the steepest parts of one of the candle curves. The number of galvanometer readings plotted during the space of five minutes was usually from 50 to 100.

At the end of a run, the strips and surrounding parts were given time completely to lose the heat imparted to them, after which readings for zero and sensitiveness were taken. The curves were corrected for changes in zero and in sensitiveness, using the equation:

$$\frac{\text{change in sensitiveness}}{\text{initial sensitiveness}} \times \text{approximate mean ordinate}$$

equals correction to ordinate.

It has been impossible to draw the curves so as to show clearly the minor fluctuations due to minute changes in the intensity of the radiation,since, as has been said, the scale to which the time abscissas are plotted is very small, compared with the scale of ordinates. These important peculiarities of the movements of the galvanometer needle were clearly perceptible, however, to one who observed the galvanometer deflections for only a little time, while their character made it perfectly evident that the swings of the galvanometer needles in their natural period exercised only an inappreciable influence on the slopes of the curves and the magnitudes of the variations recorded.

In Fig. 3, and in subsequent cuts containing bolometric curves, the smallest divisions of abscissas represent five minutes of time. The corresponding divisions of ordinates are five divisions of the galvanometer scale. In order to economize space, no attention has been given to the height of the curves relative to the base line on the plates. The total ordinates for each curve are indicated by such a symbol as this 40, indicating that the true X-axis for curves I. and II. should be placed ten divisions below the base line on the plate. Consequently, on the various plates, curves having the same ordinates are plotted one above the other, the true ordinate being indicated in the way mentioned above.

The data by which the curves have been corrected are given in Table I.

Table II. gives, in its first column, the approximate abscissas of the portion of the curve in question, and in its second column the mean ordinates of these portions. The third column contains the deviations of the mean ordinates of the portions from the mean ordinate of the whole curve. The fourth column contains these deviations reduced to percentages of the whole. The fifth contains similar deviations from the mean ordinate of all the curves of the particular standard under consideration, and in the sixth these also are reduced to percentages.

(To be Continued.)

NEW CABLE DEVELOPMENT.

Sir John Pender, whose death occurred in England last week, was "the father of the Atlantic cable," so far as the Old World was concerned. He worked in co-operation with Cyrus W. Field, and these two men were the originators of the present submarine service. But Sir John also became the head of a gigantic cable "combine." The London correspondent of the New York "Evening Post," in a dispatch to that paper on Saturday said:

"Sir John, with Scotch shrewdness, built up a huge cable monopoly in India, Australia, South, East and West Africa and the West Indies. Sometimes marriage alliances helped him, sometimes political influence, sometimes courtesies which fill Madeira and other salubrious cable stations with sprigs of English nobility. Heavy pressure from Canada and Australia, with Mr. Chamberlain's sympathy, is loosening this cable ring's tight grip upon the empire. A Pacific cable conference is now sitting in private at the Colonial Office, Earl Selborne, the Under Secretary, presiding. It has agreed that an all-British cable shall be laid forthwith from Vancouver, British Columbia, to Australia, via the Fanning Islands, Honolulu being tapped by a branch line. The conference now only has to arrange minor details. It has decided that the cable shall be laid and shall be managed not by a subsidized private company, but by a cable trust formed by the British, Canadian and Australian governments, raising a capital of £1,800,000 on joint guarantee. This new link with Australia proving a strategic and commercial success, extensions will be made to South Africa and India, thus creating a trunk line of imperial cables."

Now that Sir John has passed away his big monopoly is likely to be broken up. But the statement that the British government is contemplating the creation of a great system which shall include a practical monopoly of the Pacific is of special interest in this country, where for some time a project to construct a cable to Hawaii, and thence to Japan, has been under consideration. It will be a matter of regret if the British government gets ahead of us, for control of ocean cables means a great advantage, commercial and otherwise, in the up-to-date world.—Troy (N. Y.) Times.

Yesterday, H. S. Sands contracted with Stone & Thomas, for a complete electric lighting plant for their new building on Main street. The dynamo will be driven by two 30-horse-power gas engines. There will be 41 arc lamps and 200 incandescent and 128 show-case lamps. The outfit costs $5,700.—Wheeling, W. Va., "Intelligencer."

COST OF STREET LIGHTING.

In Brussels, M. Roully finds that, for street lighting, butterfly-flame burners, consuming seven cubic feet, give a light of 16 to 17 candles at a yearly cost of $11 each, while Welsbachs give a light of from 25 to 30 candles at a yearly cost, inclusive, of $11.26.—American Manufacturer.

COST OF GAS POWER ON STREET RAILWAYS.

Three eminent German engineers, in discussing a recently proposed plan for operating a street railway with gas, estimate the cost of a surface street railway equipped for electricity at $36,176 per mile, whereas a road equipped for gas operation would cost but $28,560 per mile—as a matter of fact, the cost of the gas road at Dessau was only $27,798.40 per mile. A 10-horse-power gas tramway car uses about 32 cubic feet of gas per car mile.—American Manufacturer.

Worcester, Mass.—The contract for the two elevators for the new City Hall was awarded to the Electric Co. of Springfield.

The Electrical Age.

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INQUIRY COLUMN 454

BUSINESS COMPETITION.

It has been frequently said that competition is the spirit of business. If this can be looked upon as the actuating force which impels not only the business man to sell, but the manufacturer to produce, then we are indeed unfortunate. There is no competition. None that would justify us in using the expression and which would give us the same pictured scene of bustling activity, such as we accustom ourselves to in periods of prosperity, such as we consider with regret in days of misfortune and financial stringency. They say that business itself is built upon a bubble. A mere inflated and unsubstantial something called confidence, which wavers like the shrinking candle light in a summer breeze. Yet, though this be true, and the substructure be intangible and unreliable, has such frightful upheavals been so frequent or so prolonged in the life of other nations?

Do they base their business on confidence, and therefore lose all aspirations when it is no longer there? There are many strong swimmers who enter a race without knowing that they will win. Upon what do they depend? Merely upon the fact that every fibre will be strained to win it; every ounce of blood used to its best.

In some, therefore, disappointment has no terrors and competition is truly the inward spirit that moves them to mighty deeds. We may well say that this great financial storm lashing the shores of America has been stirred up by a Western cyclone. There are many trying to reach a quiet harbor, but contrary winds have blown them hither and thither and the rocky snarls of the sea are lined with wrecks.

MOTORS.

The men that manufacture motors have frequently complained of the difficulty they have in getting people to buy. It seems to us that this is very discouraging. When a good article lies neglected because none will use it, the conclusions to be drawn are as follows: The party may not need it; they may not have enough money to buy it; they might be too conservative to touch it. Either of these are within the list of reasons worthy of consideration.

From many standpoints stationary motors are luxuries. Power is produced in large cities at a moderate expense and sold at a profit. In small towns, where water-power is abundant, it can be had cheaply. The use of a motor is then not a great item of expense. But it cannot hold its own with certain kinds of steam power. For special work it is the best means of supplying power; for general purposes the mere mention of the price means a period of deep silence and absolute refusal. No motor agents would complain if power was cheaper. All that is possible in the line of convenience lies in the use of a motor, and it would be used to an extent beyond our greatest expectations if some of our illuminating and power companies had paid a little more on their buried copper and new buildings. When the public desires a thing, factories can't turn that thing out quickly enough. It is difficult to bring them to this state of mind until they feel assured that they really need it. There are thousands of ice-cream freezers still to be turned by electric motors, and many more pumps in flats and apartment houses that are a source of constant worry to the self-sacrificing janitor.

In time this city will reek with motors, but that day of joy has not as yet approached. We are dependent upon others as yet, and the Jacques Battery has not depreciated the stock of any of the large lighting corporations, or dropped the price of an ampere hour. We are patient, as well as the honored representatives of motor firms.

THE SHRINKAGE OF IRON.

The action of fluid cast iron in the mould is somewhat curious. When poured into a mould in a state of fluidity, cast iron, and especially what is known technically as "gray forge," expands at the moment of solidification, thus giving a sharp impression in the mould. The expansion, slight but very noticeable, extends until in the process of cooling the iron attains the stage of red heat. Contraction then takes place, with the result that the cooled iron is noticeably smaller than the mould. In making patterns for iron castings, therefore, patternmakers commonly allow about one-eighth of an inch per foot for shrinkage. The shrinkage in castings, however, is by no means a constant quality, but varies materially with the proportion existent in the pattern and the character of the metal used—as much as one-tenth of an inch per foot being allowed when casting beams and only one thirty-second of an inch with large cylinders.

When any metal in a fluid state is poured into a cold mould, solidification commences at the outside. As the cooling is continued, the castings, therefore, would consist of a rigid outside envelope containing a soft interior. If, therefore, the condition of a small piece of such metal in the centre of a square be considered during cooling, it will be seen that the contracting force existing on each side of the square will be the same. A cube or sphere of cast iron contracts in cooling in a uniform manner throughout its mass. If two squares be placed side by side, forming a rectangle, on each half of the sides, the contracting forces are as before;

but on the ends, there being no rigid division between the two squares, both parts exert a unit of contracting force. The result is that the contracting force of the ends is equal to that of the sides; or, on a unit of length, the contracting forces are doubly as great on the ends as on the sides.

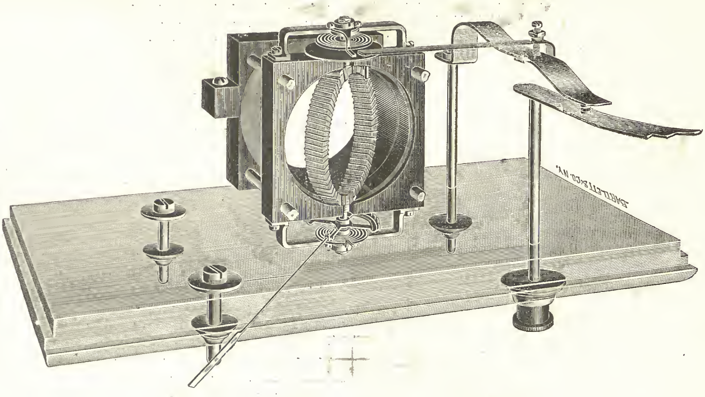
In casting, therefore, thin strips, the shrinkage of the length is very great, while in the thickness it is scarcely appreciable. A square plate shrinks little in thickness, but equally in width and breadth; a flat disk shrinks little in thickness, but equally in all diameters. A thin ring shrinks more in diameter than a thick one, and so on. When it is known that iron with different shrinkage from that generally employed is to be used in a foundry, the patterns are altered to meet the changed conditions. Silicon, unless in excessive quantities, gives a gray, soft iron which has the minimum shrinkage. In many cases a judicious mixture of iron will give the desired result without extra expense in pattern making. Charcoal iron has usually a higher melting point than that of less pure iron made with coke. It sets more quickly in the mould and contracts more, so that an extra allowance for shrinkage must be made in all patterns employed. It will be seen from the above that pattern makers require special technical skill as well as knowledge of the iron to be used in casting for their patterns. There are few employments which require greater specialized knowledge of rather a wide range than that of pattern making.—Industrial World.

ALTERNATING CURRENTS.

LESSON LEAVES
FOR
THE AMERICAN SCHOOL OF ELECTRICITY.

BY NEWTON HARRISON, E. E.

The interesting methods by which alternating current apparatus is designed and constructed, and the peculiar effects manifesting themselves, have given rise to a closer study of the subject in all its varied details. Not only have some of the greater difficulties been overcome, but its introduction beside and as an active and equal competitor of continuous currents in a commercial and practical sense is plainly evident.


BARTLETT&CO.N.Y.

MECHANISM OF ALTERNATING CURRENT VOLTMETER.

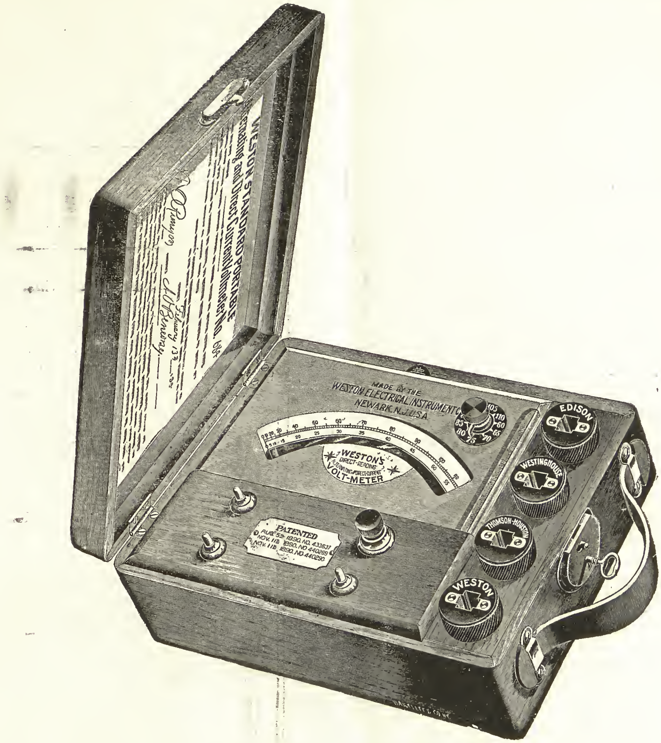
Alternating Current Motors.—For many years the sluggish progress of alternating-current practice could be easily traced to the lack of a motor which could compete in the open market with the others. It had been deemed impossible to construct one of this kind. To obtain power in the form of mechanical energy from an alternating-current circuit necessitated the use of another alternator of the same frequency. This motor, to be, was rotated up to its proper speed by some additional device, and then the current applied.

Synchronism.—With the frequency or periods of both generator and motor equal, the machines are said to be in "step," or in synchronism with each other. The difficulty now arises, however; with a dropping in speed of the motor, this condition of electrical harmony, as it were, ceases to exist. Both machines fall out of synchronism, and the motor, after a short interval, comes to rest. This difficulty was for a long time ineradicable. It was impossible to start an alternating-current motor from a condition of quietude, and likewise impossible to hold it in synchronism with considerable changes of load. Any continuous-current motor, at least, possessed this qualification of being *self-starting*; a great handicap, therefore, stood in the way of making an even test of both systems. A difficulty of this character deprived the exponents of alternating-current machinery of a most valuable feature. Transmission of power was not very practical, although the mere laying of a long line was and has been an easy achievement.

Rotary Field Motors.—It was discovered by our famous inventor, Nikola Tesla, that if by any possibility a magnetic field was caused to travel around an iron circuit, or in any way allowed to affect an armature core wound or bare—if the metal mass in the centre is free to rotate—this circulating field will drag it around to a high rate of speed. A rotary field is produced by means of polyphasal currents—peculiar impulses, identical with an ordinary alternating current, but consisting of not one, but two or three successive impulses forward and the reverse backward.

Polyphasal Currents differ in no respect from an ordinary alternating current. A single impulse rising and falling in a wire can, in imagination, be succeeded by another before the first has begun to decrease. Likewise, the second might be followed by a third impulse, which has the same difference of phase between it and the second as exists between the second and the first. This system can be developed to any extent. To create a rotary field, for instance, with a current of these impulses or waves, a ring of iron wound with three coils each one-third around, and receiving successively a wave of electromotive force, would naturally produce a magnetic field of this description. Whether iron or copper be placed in the centre, the field will drag it around. A *polyphasal* current means a current of many phases; the word *poly* meaning many. The additional fact that when an armature is gripped at points all around its periphery it is better able to develope torque, has made this innovation decidedly practical.

A Sine Wave is the name given to a wave of electromotive force or current proceeding from an alternator. It was discovered by Joubert that the mathematical curve called the sine curve and the diagrammatic representation of a rise and fall in electromotive force differed so slightly from each other that the latter deserved the same name.


WESTON STANDARD PORTABLE
Alternating and Direct Current Voltmeter No.
MADE BY THE
WESTON ELECTRICAL INSTRUMENT CO.
NEWARK, N.J. U.S.A.
WESTON'S DIRECT-READING VOLT-METER
PATENTED
EDISON
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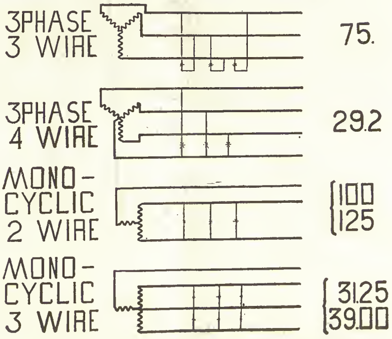
WESTON METER FOR ALTERNATING PRESSURES.



SYSTEMS OF ALTERNATING CURRENT DISTRIBUTION.

True Value of the Current.—An alternating current has no fixed or uniform value. It rises and falls like an ocean swell, beginning, growing rapidly to a hilly prominence, and subsiding again to nothing. There is no definite value to be given to the flow of an alternating current that is other than approximate. At each instant of its growth and decrease it has a decided value, but this constantly changes, varying from nothing to a maximum; that is, its highest value. We are forced, therefore, to judge by approximation of its real strength; in fact, to measure it by two methods.

Mean Current.—One of these methods is that of taking the value of the current at successive instants of its rise and fall and forming an average, calling this the mean current. If the current rose and fell and the seven tests showed values of

$$\begin{array}{c}0\\2\\4\\6\\4\\2\\0\\ \hline 18\end{array}$$

the average would be $\frac{18}{7} = 2\frac{4}{7}$ amperes.

This value, 2.57 amperes, is called the *mean current.*

Square Root of the Mean Square.—Another method is that of taking the same measurements, squaring each result, taking the average of the squares, and then taking its square root. The process with the same figures would be that of squaring

$$\begin{array}{rcr}0 &=& 0\\2 &=& 4\\4 &=& 16\\6 &=& 36\\4 &=& 16\\2 &=& 4\\0 &=& 0\\ \hline &&76\end{array}$$

Taking the average square, $\frac{76}{7} = 10\frac{6}{7}$, extracting the square root gives us 3.29 amperes. In practice this value is accepted as the nearest approximation, and is used in ordinary calculations.

London, Ont.—The Rogers Electric Company has been awarded the contract for wiring the new House of Refuge at Sarnia.

Guelph, Ont.—The contract for an electrical fire alarm system has been awarded to the Bell Telephone Company, of Montreal.

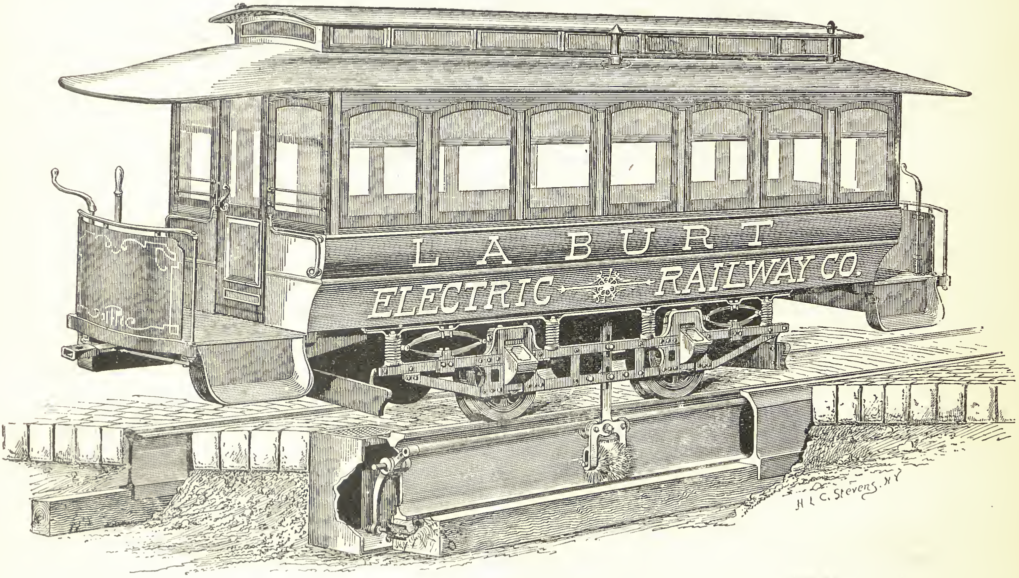
LA BURT ELECTRIC RAILWAY.

IN OFFERING the above illustrated system for propelling cars by electricity to the railway world, it has been the aim of the La Burt Electric Railway Company, of 39–41 Cortlandt street, to secure a system which would commend itself by reason of its simplicity, cheapness of construction, economy of operation, and reliance on well-known mechanical movements for its positive action, rather than upon electromagnetic features, which have proved so unreliable.

This system can be constructed at the same price as the overhead trolley for the same class of construction—that is, in cities, where pavement has to be taken up and relaid, it will cost the same, and in suburban districts where this expensive item is not encountered, it can be constructed as cheaply.

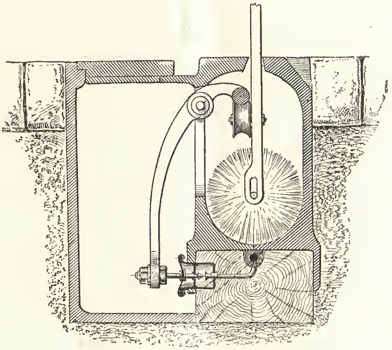
By this system any railroad, either steam, horse or trolley, can be turned into an underground electric road by putting the rail channel for the trolley between the tracks, while in new construction this item of expense can be done away with, as the rail channel can just as well be applied at the side of either rail. Less than one foot of excavation is needed.

The illustrations herewith plainly show that the live wire is laid in lead pipe underneath the stringer, or underneath the rail, where a joint is made and connection effected with the junction boxes, in which the contact is made. As the car comes along the trolley runs on the under side of a hollow steel tube, supported at either end by rock levers. As the tube is thus raised, the finger on the lower end of the rock lever is forced in, contact is made, and as the car passes on the tube drops by gravity, contact is broken, leaving the sections behind perfectly "dead." It will thus be seen that there is practically on loss of current, as for every pound of coal consumed at the power station, the required number of units of energy are delivered direct to the motor under the car, because the current is only used while the car is over a given section, and that section is cut out and becomes perfectly "dead" as the car passes to another section. At no



LA BURT ELECTRIC CAR.

time is there any current on either rail. The outside wall of the rail channel is formed by an extra piece of metal bolted and braced to the ties, while the inside wall is formed by the rail itself, either a six or a nine-inch rail being sufficient to form the channel, and all that is necessary for the successful working of the system.


CONDUIT OF LA BURT SYSTEM.

An electrician, or fairly intelligent citizen, knows that the overhead trolley is a menace to the life of every man as well as to his whole family, whose door it passes. The live trolley wire breaks, falls across the track whenever a high wind raises, or a storm of sleet coats them with snow or ice, a circuit is formed, the track is charged for blocks in either direction, and the unfortunate man or beast who steps thereon at such a time never knows what killed them. Or, the yet weaker telegraph or telephone wire breaks and falls across a live trolley wire in a storm, killing the unfortunate who runs against it. All this is utterly impossible with the La Burt system.

The future of the overhead trolley is limited, and it is possible and even probable that the next ten years will see the last of a system so crude, and so exposed to the rigors of the atmosphere and winter storms.

OTIS ELECTRIC ELEVATORS.

The Otis Company, of No. 38 Park row, New York, have met with the greatest success in all their engineering ventures. They have never disregarded the old and well-worn adage "Whatever is worth doing is worth doing well," and in every undertaking have exhibited a patience and skill which is the secret of their success. Their long and varied experience in the manufacture of hydraulic and steam elevators have enabled them to produce an electric elevator which in construction and operation has not been equalled by any other in the market. The first they ever installed has been in operation over five years. Over 1,000 electric elevators in this and foreign countries give and will continue to give the greatest satisfaction.

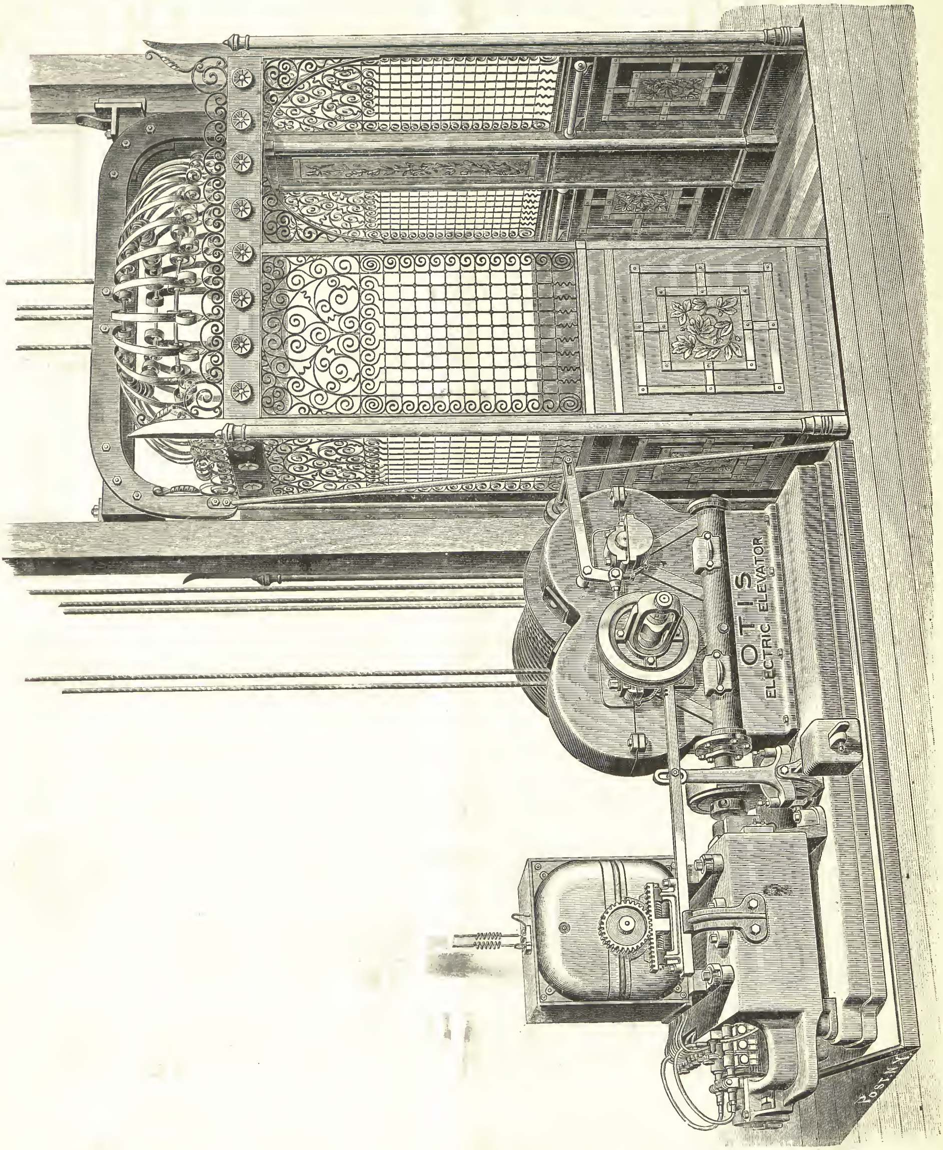
Many companies have come into existence on account of the success of Otis Bros. They are the first, however, in the electric elevator line, and have made their name a synonym of safety, durability, economy and simplicity.

The recent experiments of M. Henri Moissan with high temperatures are most interesting and his results well-nigh incredible. M. Moissan, however, needs no introduction, his work with the element Fluorin being well known and a sufficient guarantee of his exactness. It has been determined quite recently that, owing to imperfections in the pyrometers formerly used, the temperatures above 1000° C. have been grossly exaggerated. The highest temperature attainable by coal-gas and an oxygen blast is about 2000° C., while the highest temperature utilized in industrial work is only about 1500° C. At the former temperature a quicklime crucible only can be used. Hence it will be seen that the temperatures obtained by M. Moissan are most remarkable. For these higher temperatures a furnace is constructed of two bricks of quicklime, carefully cut out and placed one above the other, the lower brick having two longitudinal grooves for the electrodes and a small cavity in the middle to serve as a crucible. The arrangement is thus similar to that used in melting platinum. In the first experiments a small Edison dynamo driven by a gas-engine was used. A current of 30 amperes and 55 volts gave a temperature not much exceeding 2250° C. Later a current of 450 amperes at 70 volts was used, representing about 50 horse-power, and with this 3000° C. was attained.

At 2500° C. the oxides of calcium, strontium, and magnesium crystallized rapidly, and at 3000° C. the quicklime of which the furnace was composed ran like water. At this same temperature the lime was reduced by carbon, and the metal calcium was "liberated in abundance." A carbide of calcium was also obtained fusible at a red heat. Fine crystals of the borides and silicides were readily formed. Magnesia was melted as easily as the lime, and alumina was melted and crystallized at 2250° C. By the addition of a small amount of the oxide of chromium, artificial rubies were obtained. By continuing the treatment of alumina this was completely volatilized, thus providing a parallel case to the volatilization of silica, effected by Seger. Titanic acid was crystallized, fused, and volatilized according to the temperature, and zinc oxide was volatilized freely and deposited in long, transparent needles. M. Moissan, it is said, has also produced a number of microscopic diamonds by the crystallization of carbon after the following method: Pure carbon obtained by burning sugar was dissolved in an ingot of iron and this then heated to 3000° C. By the application of cold water a sudden crystallization was effected, and true diamonds of microscopic size were obtained. As M. Moissan is continuing his researches, further results will be looked for with interest.—*Dr. R. A. Witthaus, in Cassier's Magazine.*

Harrisburg, Pa.—A charter has been issued to the Pittsburgh and Clearfield Telephone and Telegraph Company, of Phillipsburg, to build and operate telephones in the counties of Centre, Clearfield, Cambria and Jefferson. Capital, $1,000. Directors: William H. Denlinger, John G. Platt, Andrew J. Graham, Thomas J. Lee, Griffith Lychenthaler, Phillipsburg.

Montreal, Que.—The Montreal Park and Island Railway has recently let the contract for the construction of the St. Vincent de Paul branch, to be completed this fall.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FOR ELECTRICAL PURPOSES.

Phonograph Tubes,
Hook Insulators,
Magnet Heads,
Battery Cells,
Sounder Covers,
Relay Covers,
Cord Adjusters,
Socket Bushings,
Switch Handles,
Key Knobs,
Nipples,

SHEET, ROD, TUBING Always on Hand.

ESTIMATES FOR SPECIAL WORK GIVEN.

THE GOODYEAR VULCANITE CO.,

OFFICE,
353 Broadway, N. Y.

FACTORY,
Morrisville, Pa.

COMPRESSED AIR MOTORS IN FRANCE.

A line on the Popp-Conti system is to be opened in St. Quentin, France, in the Department of the Aisne, in which the inventors have sought to create an intermediary system which would obviate the two principal objections, the carrying of a large amount of dead weight and the loss of time in taking cars to the charging stations. To do this it was necessary to provide, on the line of rails over which the cars travel, a series of stopping-places at short intervals, corresponding to the stations where passengers enter and leave the vehicles. It was desirable that while this necessary stop was being made communication should be automatically made between the reservoirs on the car and the air mains placed beneath the track. As the pressure of air in the main, delivered from the central station, located at a point more or less removed, was comparatively low, and as it was necessary to retain in the reservoirs on the car a sufficient amount of compressed air to carry a car over two sections of the line in the event of one section being out of order, it was evident that the reservoirs must be relatively large and the charging stations close together. In the St. Quentin installation the central station is equipped with three 100-horse-power compressors. The central station under this system does not have to labor under the disadvantage of having to provide an irregular amount of power, or rather the irregularities occur at fixed intervals and within well-known limits. The distributing mains comprise pipes varying from 1.6 to 4 inches in diameter, and as the rails comprise a number of lines diverging from one common point, a few circular lines of air mains are found to supply the different air junctions desired, with a total length less than that of the tracks. By the use of the looped system of mains, it is possible to isolate any section of pipe for repairs, by means of valves, while the rest of the system is kept under pressure. At each station the rails and on the level of the roadway a jointed plate, which under certain conditions opens freely in the centre. The passage of the first pair of wheels over the rails causes the plate which covers a brick pit to open. From the pit rises a flattened pipe, which is in communication with the air main, and is joined to a pump barrel. The whole governing of the junction arrangements between the air main and the mouth of the receiver on the car is under control of an ingenious device intended to be operated only by the vehicle which it is intended to serve.

The first and second pairs of wheels operate, as stated, upon a pedal. This is placed in a section of special rail between two ordinary rails and immediately adjoining the plate. The pedal is operated by the flanges of the car wheels, and is so held up by means of a coiled spring as not to be operated except under a considerable weight. Thus the narrow wheels of a light vehicle may enter the grooves of the rail and pass over the pedal, which would remain unaffected by its relatively light pressure, while a heavy truck of weight approaching that of the street car will necessarily have a wheel too broad to enter the groove of the rail, and therefore could not touch the pedal. The second pair of wheels passing over the pedal reverse the operation, sever the air connection and return the junction mechanism to its place in the pit beneath the street level. There are a number of ingenious details attaching to the junction of the feed connection with the car-storage reservoirs. The charging of a car with the requisite energy is stated to occupy only fifteen seconds. The motor is placed under the middle of the car and is accessible from the interior. It is a compound engine with variable expansion, and according to the power required it can be worked with double expansion or by full admission of air into the cylinder. The Popp-Conti system comprehends the double heating of the compressed air before it is admitted into the cylinders. This is accomplished by means of a coke fire, which is fed automatically. The motor may be driven from either end of the car by means of three small valves placed conveniently for the driver. The first of these operates the links, the only function of which is to change the direction of the engine. The admission of air into the small cylinder is regulated by means of valve gear, which is controlled direct by the driver, and the same hand wheel which governs the full range of power of the engine also serves in its altered position to apply the maximum retarding power of the brakes.—American Gas Light Journal.

WHERE ARE WE?

The ratio of increase in the yearly consumption of gas is decreasing. It sounds a bit strange that an increase can decrease, but it is not at all strange to learn that the decrease of the increase is due to various mills having introduced the electric light. Long may there and elsewhere the decrease in the increase of the use of gas go on, and the increase in the increase of the use of the electric light continue. If the increase of the increase——.—London Electricity.

POSSIBLE CONTRACTS.

Pottsville, Pa.—The borough is considering the advisability of erecting its own electric light plant.

Xenia, O.—Sealed proposals will be received until 12, noon, Sept. 1, 1896, by the trustees of the Ohio Soldiers and Sailors Orphan's Home at Xenia, O., for the furnishing, construction and operation of an electric light plant, in accordance with the plans and specifications proposed therefor. Proposals must be addressed to David Lanning, superintendent, Xenia, O.

Philadelphia, Pa.—Sketches have been completed by Cope & Stewardson for a hospital for the Pennsylvania Institution for the Blind. The building will be two stories high and the latest systems of electric wiring, steam heating, etc., will be used. The entire cost is not to exceed $100,000.

Toledo, O.—Sealed proposals will be received up to 11 o'clock a. m., of Thursday, the 20th day of August, 1896, for the furnishing and installing of the electric light, fixtures for the new Lucas County, O., court-house, according to general plans and specifications prepared by David L. Stine, architect, which are on file at the office of the auditor of Lucas County, O. Bidders may also submit designs of their own, based upon the general specifications. Address Chas. H. Jones, County Auditor.

St. Paul, Minn.—The county commissioners have decided to invest in an electric light plant for the city hospital.

Berlin, Conn.—Electricity is to be used in the lighting of the new passenger station. Fifty-seven lamps will be put in.

Albany, N. Y.—Messrs. Lewis & Wallace, patentees of the Crown automatic car coupler, will probably locate their plant in this city.

New York City.—Plans have been prepared for a new addition to the St. John's Home for Boys, to cost about $250,000.

Norfolk, Va.—A syndicate of New York and Boston capitalists will erect an eight-story hotel, to cost about $750,000. Plans and specifications for the same have been prepared.

Washington, D. C.—Work will soon be started on the improvements of the House and Senate chambers of the Capitol. $55,000 are to be expended on the improvement of the ventilation of the Senate wing, including the installation of refrigerating apparatus, and $45,000 for an extension of the electric light plant at the Capitol. Contracts for the performance of these works are now being let.

New York City.—John Casey, of No. 115 West 91st street, will build three brick stores and flats, to cost $275,000, on the southwest corner of Amsterdam avenue and 105th street.

Wm. B. Frank, of No. 131 West 129th street, will build a stone, brick and terra cotta apartment house, to cost $150,000, at the northeast corner of West End avenue and 79th street.

Plans are being prepared by Bruce Price for a sixteen story terra cotta and brick office building to be erected on Broadway and 26th street; cost, $1,500,000.

A ten-story brick building will be erected at Nos. 570-572 West Broadway, by John B. Ireland, at a cost of $125,000.

Negaunee, Mich.—The common council has decided to look into the matter of electric lighting with a view to building a city plant, and is securing estimates from electrical engineering firms.

Carthage, O.—An election will be held August 8th to vote on the issuance of bonds to extend the water and light plants, and the construction of an electric fire alarm.

The Edison Electric Company, of New Orleans, La., will remove its plant and erect a new structure. It is stated that the proposed building will be of stone and steel, cost about $85,000, and will have engines of 6,000 horse power.

NEW CORPORATIONS.

Detroit, Mich.—The Commercial Supply Co., manufacturing electrical supplies, has been organized and incorporated with a stock of $1,500 paid in, by Perry E. Phillips and A. A. and Geo. L. Robinson.

Elizabeth, N. J.—The Imperial Electric Company, of Westfield, has filed articles of incorporation. The company will begin business with a stated capital of $60,000, and will manufacture electrical machines and supplies. The incorporators are J. W. Eskhorn and W. B. Elliott, of Westfield, and J. J. Linder, of Brooklyn.

Chicago, Ill.—Marquette Electrical Company, Chicago; capital stock, $2,500; incorporators, Edwin O. Lanphere, Henry J. Brubaker and Ripley N. Baylis.

Chicago, Ill.—Carbon Rheostat and Electrical Manufacturing Company, Chicago; capital stock, $10,000; incorporators, Sydney Stein, Henry R. Platt and Frank Crowe.

Joliet, Ill.—The Joliet Electric Street Railroad Company has been reincorporated, and the capital stock placed at $300,000. The officers are: Jacob A. Henry of Joliet, president; Geo. F. Duncan, Portland, Me., vice-president; Henry O. Cox, Portland, Me., treasurer; William B. McKinley, Chicago, secretary and manager.

NEW TELEPHONE COMPANIES.

Indianapolis, Ind.—Tippecanoe Telephone Company, of Romney, has been incorporated, with a capital of $10,000, to operate lines in Tippecanoe, Clinton and Boon counties.

Baltimore, Md.—The Standard Telephone Company, of Baltimore, has been incorporated by Thomas S. Hodson, Charles O. Cooper, Edward S. Kines, J. Tiers Reardon and Wm. F. Beiswanger. Capital stock, $15,000. J. Tiers Reardon is president, and C. O. Cooper, secretary. The treasurer has not been elected. To construct telephone lines from Crisfield and Pocomoke City, thence to Salisbury, Delmar, Laurel, Easton, Chestertown, Centreville, and Belair, with connections in Baltimore.

Wilkesbarre, Pa.—The People's Telephone Co. has been chartered to build a line from Hazleton through Wilkesbarre and Pittsburg. Capital stock, $5,000. Directors, M. B. Houpt, C. E. Stegmaier, A. A. Sterling, P. R. Raife and John A. Schmitt.

Springfield, Ill.—The Richland County Telephone Company has been incorporated at Olney, with a capital stock of $25,000. The incorporators are: Edwin E. Crebs, E. J. Briswalter and G. M. Brock.

Austin, Tex.—Cicero Telephone Company has been incorporated. Capital stock, $10,000. Incorporators, R. H. Trail, W. O. Cline, Louis Nissen, C. H. Zimmerman, O. J. Roath, George D. Rogers and M. I. Isgrig.

TELEPHONE NOTES.

Youngstown, O.—The Mahoning Valley Electric Railway Company, will during the next month establish a metallic return telephone system along the entire line. It will be one of the most notable improvements made since the line has been in operation. When the telephone service is established the Youngstown and Niles powerhouses can have telephone connection. Work on the system will be commenced in a short time.

Muskegon, Mich.—A 30-year franchise has been granted to the Citizens' Telephone Company to put in an exchange and supply 'phones for residences and business places. The officers of the company are: President, Peter C. Burns, of Kokomo, Ind.; Vice-President, Chas. H. Hackley; Treasurer, L. B. Smith; Secretary, Hugh Park. The exchange will be installed by Oct. 1 and a state line be in between Grand Rapids and Muskegon by Nov. 1.

Buffalo, N. Y.—W. R. Smallwood is putting a telephone line into the village of Cattaraugus similar to the one in Gowanda.

Maiden Rock, Wis.—W. E. G. Loeffler contemplates extending a telephone line from Stockholm to Lunel, so as to have communication with Pierce County towns, a distance of about seven miles.

Greenwich, N. Y.—A telephone line from Cossayuna to Fort Edward, a distance of 14 miles, will at once be constructed. John Huchens has the contract for the placing of the poles.

Batavia, N.Y.—The Automatic Service Telephone Company, of Buffalo, has filed an application for a franchise to do business in Batavia.

Atlanta, Ga.—The Atlanta Telephone Company secured a charter to operate a new telephone system in Atlanta. By the charter the company was required to commence actual work within 90 days from the time of granting the charter. Work has not been yet commenced, but the company was yesterday given an extension of time of 60 days longer.

Wayne, W. Va.—Cooper & Johnson, local contractors, have received the contract and right of way to construct a telephone line between East Lynn and Huntington, a distance of about 30 miles.

Norfolk, Va.—There is a move on foot to establish a telephone line from Smithfield to Norfolk, by way of Isle of Wight courthouse, Windsor and Suffolk, and to connect all the territory on Hampton Roads.

Chicago, Ill.—The Austin Business Men's Association has been granted a franchise by the town board of Cicero to place a local telephone exchange in the town. The new company has a capital stock of $10,000, and will also put in a burglar and fire alarm system.

Grand Rapids, Mich.—The Saugatuck and Ganges telephone line is to be extended to Allegan to connect with the state asylum.

Westerly, R. I.—The Providence Telephone Company is to make all its Westerly system over into the metallic circuit. This improvement is being made now, Mr. W. M. Gates being in charge of the work.

Laurel, Ia. The question of a new telephone connection with Gilman is now being agitated at Laurel.

Somerville, N. J.—The stockholders of the Somerville and Raritan Telephone Company, which has been in business a little over a year, have sold their stock and transferred their company, with its property and business, to the New York and New Jersey Telephone Company.

New York Notes.

Mr. O. B. Green, the incandescent arc lamp supply man, of No. 14 Cortlandt street, New York, was at Chautauqua Lake with a special X-ray outfit, designed by Max Osterberg, E. E. A. M.

The Westinghouse Electric and Manufacturing Company has received an order from the Carnegie Steel Company, Limited, for a complete electrical equipment for the Duquesne Steel Works. The new equipment will furnish power for all light cranes, and it is expected that electricity will be employed also in driving the rolls. There will be sixteen large dynamos at the start, and the installation will be made with a view to adding other dynamos.

Gillett, Col.—Gillett recently celebrated the starting of the electric light plant, the starting off being without a jar. The plant, although small, is one of the best in the State, and is owned by Denver parties. It consists of Thomson-Houston generators and General Electric fittings. The engine is of the new patent ball-governing kind, being the first to be used in Colorado.

Judgments by confession were entered yesterday in the Circuit Court against the National School of Electricity for $5,626 and $469, the first amount in favor of John J. Swenie and the other in favor of Louise C. Stanton. The offices of the concern at No. 335 Dearborn street, were closed by Deputy-Sheriff McMahon, on executions issued upon the judgments.—Chicago Tribune, May 30.

Albany, N. Y.—The Washington County Telegraph and Telephone Company has been incorporated to construct and maintain a telephone or telegraph line. Capital, $3,500; and directors, J. Somes McClellan, of Cambridge, W. L. Dundon, of Salem; D. L. Hall and N. S. Pratt, of Cossayuna; W. D. Stevenson, of North Argyle; R. Van Wormer, of Argyle, and W. C. Cuthbert, of Fort Edward.

TELEPHONE PATENTS.

ISSUED JULY 15, 1896.

563,877. Telephone System. W. R. Patterson, Chicago, Ill. Filed Jan. 21, 1896.

563,920. Telephone System. A. Graham, London, England. Filed May 3, 1894.

563,935. Telephone Transmitter. H. A. Martin, Hartford, Conn. Filed Nov. 13, 1895.

564,173. Telephone Exchange Apparatus. J. J. Carty, New York, N. Y. Filed Nov. 17, 1887.

ELECTRICAL and STREET RAILWAY PATENTS.

Issued July 14, 1896.

563,724. Annunciator System for Buildings. J. M. Arthur, Detroit, Mich. Filed April 1, 1896.

563,743. Circuit Controlling Device. J. H. Clark,, Boston, Mass. Filed Jan. 29, 1892.

563,749. Trolley Wheel. C. W. Cottrell, Asbury Park, N. J. Filed Aug. 28, 1895.

563,773. Electric Arc Lamp. J. C. Knight, Roselle, N.J. Filed Nov. 21, 1895.

563,780. Electric Heater. C. H. Minchew, Taunton, Mass. Filed Nov. 19, 1895.

563,831. Thermostat. L. G. Woolley, Grand Rapids, Mich. Filed June 24, 1895.

563,832. Automatic Fire Alarm System. J. Young, Chicago, Ill. Filed Aug. 8, 1895.

563,895. Rotary Transformer. E. Thompson, Swampscott, Mass. Filed Dec. 21, 1893.

563,911. Dynamo-Electric Machine. W. Cooper, Schenectady, N. Y. Filed April 18, 1896.

563,917. Instrument for Measuring Electric Resistances. S. Evershed, London, Eng. Filed Feb. 6. 1896.

563,922. Electric Lamp Stand. W. D. Gridley, Brooklyn, N. Y. Filed Feb. 19, 1896.

563,924. Railway Signal. C. Hansel, Easton, Pa. Filed Dec. 4, 1895.

563,940. Dynamo-Electric Machine. A.L. Parcelle, Boston, Mass. Filed Jan. 7, 1896.

563,960. Electric Light for Cold-Storage Rooms. D. B. and R. H. Hawes, Springfield, Mass. Filed May 22, 1896.

563,998. Trolley Finder. H. H. Blanchard, Augusta, Me. Filed Sept. 24, 1894.

564,036. Electric Headlight for Street Cars. A. C. Thompson, St. Louis, Mo. Filed Aug. 26, 1895.

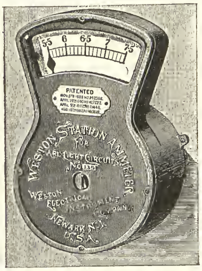
564,054. Electric Railway System. D. M. De Witt, Morrillton, and W. K. Elliott, Little Rock, Ark. Filed Jan. 29, 1896.

564,084. Protective Appliance for Electrical Apparatus. A. De Khotinsky, Boston, Mass. Filed May 5, 1896.

564,101. Printing Telegraph. J. J. Reifgraber, St. Louis, Mo. Filed July 30, 1895.

564,168. Speed and Direction Indicator. G. A. Tower, Richmond, Va. Filed March 21, 1896.

564,174. Armored Insulating Conduit. R. T. Elwell, Hyde Park, Mass. Filed Jan. 28, 1896.



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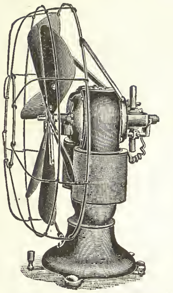

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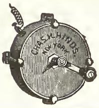

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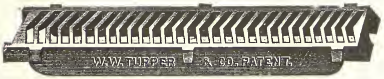

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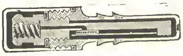

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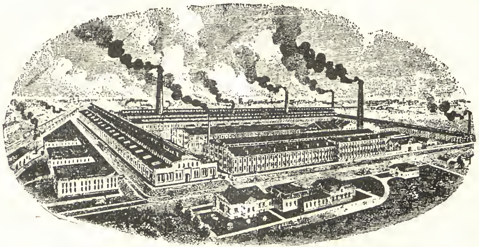

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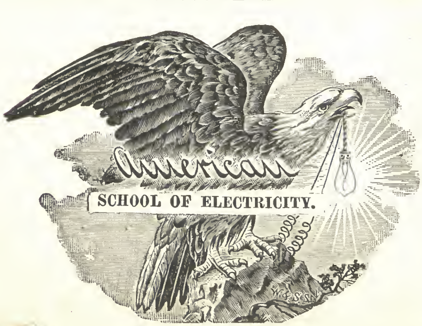

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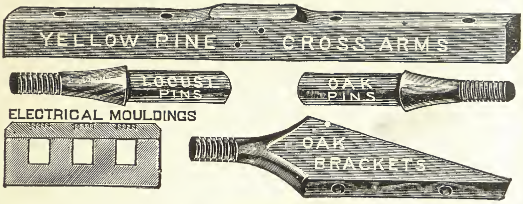

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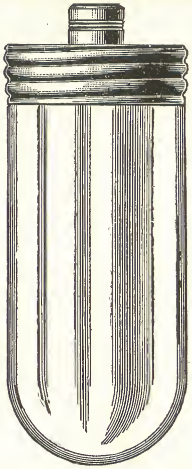

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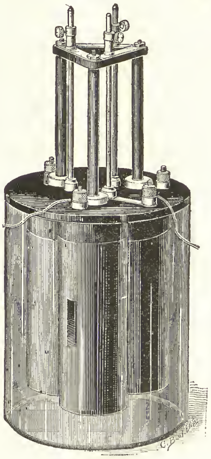

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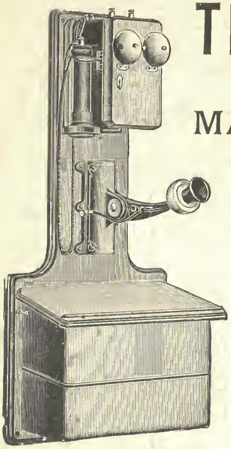

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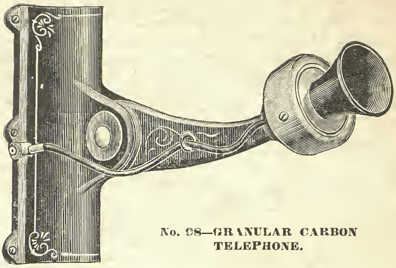

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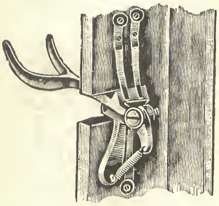

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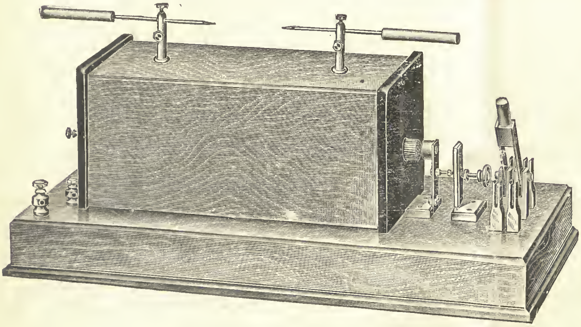

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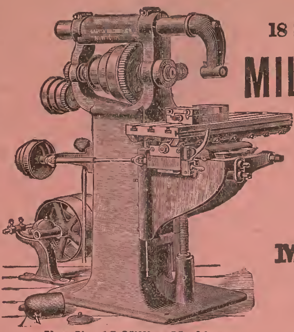

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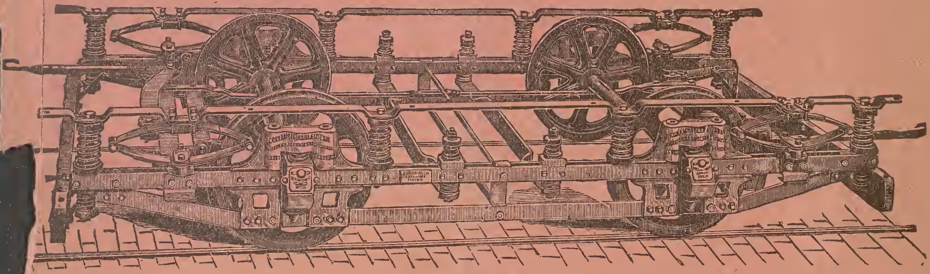

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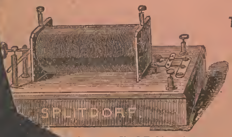

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